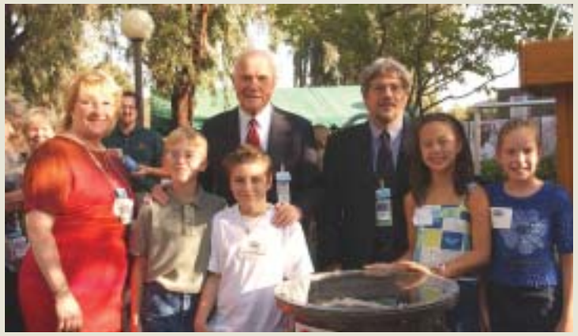
Shaping the Laboratory's Future

In 2002, Livermore's 50th anniversary events and publications celebrated numerous past accomplishments and a tradition of scientific and technical excellence. Current challenges and future prospects were also the focus of commemorative activities. The next half-century begins with a new director, Michael Anastasio, who was selected in June 2002. He is leading a Laboratory that is committed to meeting important programmatic responsibilities, seizing opportunities to address emerging national needs, and conducting operations in a safe, secure, and efficient manner.

Livermore's most valuable asset is its quality workforce, and one of the new director's top priorities is for the Laboratory to continue to attract an outstanding staff. Livermore strives for a workforce that is committed to excellence and reflects the diversity of California and the nation. The Laboratory seeks to provide a work environment in which all employees can contribute to the fullest and feel valued for their role.

Many 50th anniversary events involved the participation of not only employees—past and present—but also neighbors, research partners, and work sponsors who have shared in Livermore's successes. The Laboratory and its staff have grown as part of local communities, contributing to civic endeavors and a safe, clean environment, and as part of the University of California, contributing to its mission of education, research, and public service. Livermore is also a vibrant member of the international scientific community, partnering with other DOE and NNSA laboratories, universities, U.S. industry, and researchers around the world. For the nation, the Laboratory remains focused on ensuring national security and applying science and technology to the important problems of our time.



Finishing touches to the Laboratory's time capsule were added by astronaut and U.S. Senator John Glenn at ceremonies that included Laboratory employees and members of local communities.

New Director Takes on Challenges and Opportunities

Jay Solmonson, ANG Newspapers

New and former Laboratory directors Michael R. Anastasio (left) and C. Bruce Tarter.

In June 2002, Michael R. Anastasio was named the ninth Laboratory director by the University of California Board of Regents. Anastasio succeeds C. Bruce Tarter, who served as director for eight years while the Laboratory acquired vastly improved scientific capabilities for stockpile stewardship and greatly expanded programs to counter the proliferation of weapons of mass destruction.

As Anastasio accepted the responsibility, he emphasized that employees are the "heart and soul" of the Laboratory. The new director set as one of his top priorities continuing to attract to the Laboratory the caliber of people who have sustained Livermore's scientific excellence over the years. Current challenges arise from Livermore's need to deliver on important programmatic milestones and meet high standards in operations. In his many meetings with Laboratory staff, Anastasio has been inspiring employees to meet those challenges and to seize opportunities to meet pressing national needs through advances in science and technology. Prominent in his message about the Laboratory, its culture, and its future is a succinct list of values to guide employees' actions and public expectations about Laboratory performance.

In conjunction with his focus to ensure the continuing vitality of the workforce, Anastasio has launched an in-depth review of the Laboratory's current science and technology investment strategy. The goal is to update it, particularly in light of evolving national security needs and significant opportunities to make great strides in science and technology. Research excellence as well as people underpin the Laboratory's programs and make Livermore an exciting place for young scientists, engineers, and support staff to grow their careers.

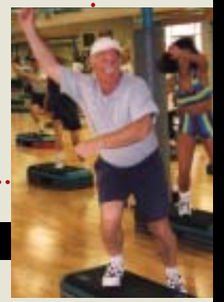
We Value

- Passion for Mission.
- Integrity and responsible stewardship of the public trust.
- Simultaneous excellence in science and technology, operations, and business practices.
- Balancing innovation with disciplined execution.
- Teamwork while preserving individual initiative.
- Intense competition of ideas with respect for individuals.
- Treating each other with dignity.
- A high-quality, motivated workforce with diverse ideas, skills, and backgrounds.
- Rewarding and recognizing performance.
- Commitment to the collective success of the Laboratory.

Improving the Workplace and Attention to Staff Needs

Ensuring the continuing vitality of the workforce is a high priority of Laboratory management. To better and more systematically understand the issues facing employees and to assess their views, the Laboratory conducted a formal survey of employees' opinions in June 2001.

Survey Action Teams were formed to recommend improvements in response to survey results, which detailed the needs of the Laboratory's increasingly diverse workforce. The teams finished their work in February 2002, and Laboratory senior management responded with improvements in various areas. A number of recommendations have been implemented, such as expanded work/life services, additional career development and training programs, and new flexible work schedule options. Plans in other areas are progressing and will be implemented in 2003, including improvements to the Laboratory's performance management system.



Providing Effective Management and Good Business Practices

Managed by the University of California (UC) for the DOE's National Nuclear Security Administration (NNSA), the Laboratory has been working closely with the University and NNSA to improve the performance-based management system under which Livermore and Los Alamos operate. Since their inceptions, Lawrence Livermore and Los Alamos (as well as Lawrence Berkeley) national laboratories have been part of UC. The University has provided the special environment and stability that have enabled the laboratories to make many remarkable scientific achievements and vital contributions to national security.

In 2002, the performance-based management assessment process was revamped to closely align the measured objectives with integrated mission performance, scientific and technical excellence, and operational effectiveness. The performance evaluation process will help ensure sharp focus on the most important elements of mission execution and reinforce efforts to further improve program integration between the two UC-managed national security laboratories.

In both scientific work and day-to-day operations, Laboratory employees expect to be accountable to high standards. However, recent events at Los Alamos have called into question the standards

of business operations at the UC national laboratories. In response, Director Anastasio took actions to examine key areas of the Laboratory's operations, provide reassurance that business policies and practices are sound, and make improvements wherever necessary. Livermore has in place high expectations about staff performance, prudent business practices that include checks and balances, and effective training programs. In particular, in the areas of property management and purchase cards, the Laboratory implemented comprehensive accountability systems that have been carefully designed and tested before implementation.

Safe, Secure, and Environmentally Compliant Operations

Safe, secure, and environmentally compliant operations result from the dedicated efforts of all employees. DOE's Integrated Safety Management (ISM) System is in place at Livermore. In addition, in January 2002, NNSA and UC approved the Laboratory's plans for implementing an Integrated Safeguards and Security Management (ISSM) System. These systems help ensure that safety and security stay a top priority at the Laboratory. In the four years since ISM was implemented, the Laboratory has reduced annual illness and injury rates from 5.6 to 2.9 percent of full-time employees. This rate is less than rates reported by corporations doing similar work that have achieved Voluntary Protection Program status by the Occupational Safety and Health Administration. Two years and well over two million hours of work at the National Ignition Facility construction site without a lost workday accident (see p. 13) are evidence of effective safety management and performance.

Protection of sensitive information, nuclear materials, and other valuable assets at the Laboratory is critically important. An extensive security apparatus is in place, and continual adjustments and upgrades are made to address new threats and concerns. The Laboratory took swift actions to enhance security after the September 11 attacks and now operates routinely at heightened security. Additional security enhancements are being pursued. Protection employs the use of increasingly sophisticated measures in a cost-efficient manner. An example is Argus (photo at bottom left), a computerized system to provide reliable, high-level security. The system was designed and engineered at Livermore, where it has undergone many upgrades and enhancements since it was first installed in the mid-1990s. Argus is in operation at other DOE sites and is being installed at additional locations.

In 2002, the Laboratory successfully met 11 regulatory-required milestones for environmental cleanup activities at the main Livermore site and at Site 300, a remote experimental area located about 25 kilometers southeast of Livermore. Six major documents (including characterization reports, remedial designs, planning documents, and five-year reviews) were submitted and five soil-vapor and groundwater treatment units were completed on schedule. Ongoing efforts are yielding good progress in the cleanups. For instance, at Site 300, a plume of groundwater contaminated with volatile organic compounds (VOCs) at concentrations above drinking water standards once extended more than a kilometer offsite. This plume is now fully contained onsite, with only one Site 300 well showing VOC contamination slightly above these standards.

A Good Neighbor

The Laboratory's annual campaign to Help Others More Effectively (HOME) raised $1.4 million for Bay Area and Central Valley charitable organizations, the fifth straight year of record-setting contributions. HOME is one example of many outreach activities that include employee participation in community assistance and economic development organizations; environmental, health, and safety working groups; and educational outreach activities.

Educational programs include activities such as science fairs and student and teacher programs. An example is a two-day-long symposium held in September 2002 and attended by more than 120 middle school, high school, and community college science teachers. This was the third year for the Edward Teller Science and Technology Symposium, which is funded by the Laboratory and held in collaboration with the Edward Teller Education Center and UC Davis. Teachers tour state-of-the-art research facilities, talk informally with Laboratory scientists, and participate in hands-on workshops in biology, chemistry, radiation science, physics, optics, and environmental science.

Other cooperative efforts with local communities include the March 2002 agreement among a number of emergency response agencies to establish a consolidated fire dispatch system within Alameda County. Consolidation saves participants money, improves fire and emergency medical services, and enhances mutual aid. The new Consolidated Emergency Dispatch Center (bottom right photo) is located at the Laboratory. The Laboratory is also working closely with area mutual aid agencies and the cities in the Tri-Valley area to coordinate emergency planning efforts.

Part of the University of California

Many mutually beneficial collaborations between the Laboratory and UC campuses serve to strengthen research programs at Livermore and provide the campuses with access to the Laboratory's multidisciplinary capabilities and special research facilities. Examples include the Center for Biophotonics and the UC Davis Cancer Center, as well as the Laboratory's assistance in the establishment of UC Merced. The new university plans to have a close affiliation with Livermore, and research will be aligned with the Laboratory's in a number of areas. Laboratory staff members are helping to define scientific and engineering programs at the campus and are serving on search committees for senior staff.

The new Center for Biophotonics, located at UC Davis, will aid in the development of new technologies for a wide range of health-related applications, including imaging or selectively treating tumors, sequencing DNA, conducting biochemical studies, and identifying single biomolecules within cells. Dedicated in October 2002, the National Science Foundation–funded center was established in partnership with the Laboratory and eight other institutions. Livermore–UC Davis collaborations on biophotonics, for example, have led to the development of a portable pathogen detector, an instrument that analyzes a small blood or breath sample with light to quickly determine whether someone has been exposed to a pathogen in a bioterrorist attack or to a new infectious disease.

The UC Davis Cancer Center, established in partnership with the Laboratory, achieved National Cancer Center designation by the National Cancer Institute in July 2002. With this prestigious award comes a $1.2-million grant for each of the next three years. The center combines Livermore's science, medical, and engineering expertise with UC Davis's expertise in cancer research and clinical medicine. The work of the center encompasses six areas: molecular oncology, cancer biology in animals, cancer therapeutics, cancer etiology prevention and control, prostate cancer, and biomedical technology. Each area has 25 or more researchers involved, with participants from both Livermore and UC Davis.

Participating in the dedication of the Center for Biophotonics, a Livermore scientist shows a detector for measuring biological agents.

Broadly Benefiting the Nation and the State of California

Bioscience and health-care research and development at the Laboratory entails not only partnerships with other research institutions but also with U.S. industry. Many Livermore-developed technologies are undergoing commercialization. Their applications range from improved health care, such as the PEREGRINE system for planning radiation therapy, to a variety of tools for rapid detection of infectious diseases and biological agents.

In addition, other advanced technologies are being developed in partnership with industry. Most notable is work with an industrial consortium and Sandia and Lawrence Berkeley national laboratories to develop extreme ultraviolet lithography for fabricating the next generation of computer chips. One of the supporting technologies, a precise mirror-coating deposition system, earned Livermore and its industrial partner an R&D 100 Award in 2002 (photo, bottom right).

While focused on national needs, Livermore's research activities and capabilities also benefit California residents in special ways. For example, expertise at the Laboratory is helping state and local agencies on a wide range of water issues, from analyses of regional water supplies to development and application of new technologies for the characterization and cleanup of contaminated groundwater. Efforts have included an assessment of aquifer recharging for the Salton Sea, studies of long-term water recycling for Orange County, the characterization of MTBE in groundwater, and ongoing analyses (with the U.S. Geological Survey) of drinking water quality in California public water supplies. In addition, in support of the war on terrorism, the Laboratory works closely with response agencies to develop capabilities that meet real-world operational needs. Many of Livermore's first-responder and end-user partners are agencies within California.

Award-Winning Science and Technology

Each year, the scientific and technological accomplishments of Livermore employees are recognized outside the Laboratory by prizes, awards, and front-page publicity. Some of these achievements are described here. In addition, Laboratory scientists and engineers were responsible for 143 invention disclosures, 123 patent applications, 44 foreign patent applications, 102 issued U.S. patents, and 35 issued foreign patents in FY 2002.

Secretary of Energy Spencer Abraham announced two Livermore winners of the E. O. Lawrence Award, Bruce T. Goodwin and Benjamin D. Santer. Goodwin received the award in the national security category for his research on the complex dynamics of the fission triggers of thermonuclear weapons. Santer was honored in the environmental science and technology category for his contributions toward understanding the effects of human activities on Earth's climate.

Edward Teller received the Secretary's Gold Award, the Department of Energy's highest honor, for his outstanding contributions to science and the security of the nation. As Energy Secretary Spencer Abraham presented the award during a visit to the Laboratory, he said, "Dr. Teller is one of the giant figures of the 20th century, whose contributions to winning both World War II and the Cold War are immeasurable."

Former directors who were "present at the creation" of the Laboratory—Edward Teller, Harold Brown, John S. Foster, Jr., and Michael M. May—were presented University of California Presidential Medals by President Richard Atkinson. Herbert York had already received the award, which is the highest honor the president of the University can bestow.

R&D Magazine annually selects the 100 most technologically significant new products and processes, ones that are workable and beneficial to the real world. The Laboratory now has a total of 91 R&D 100 Awards, including the 2002 award winners:

• In situ rolling circle amplification (IRCA), a fast and inexpensive method to precisely locate a damaged or abnormal gene, indicating the presence or tendency toward a particular disease.

• The silicon monolithic microchannel (SiMM) cooling system, a module packaging technology for the smallest, most powerful, and least expensive laser-diode pumps ever.

• The solid-state heat-capacity laser (SSHCL), which produces up to 13,000 watts in a single, high-quality beam with energy of 600-plus joules, making it the most powerful solid-state laser in the world.

• The Production-Scale Thin-Film Coating Tool, developed by the Laboratory and Veeco Instruments Inc., a deposition system that opens the door to advanced high-volume manufacturing for the next generation of microprocessors.

• The transcutaneous electrical nerve stimulation (TENS) pain-management device, which inhibits the transmission of pain signals to the brain.

• Hierarchical Data Format 5 (HDF5), a file format and software library for managing, exchanging, and archiving large, complex types of data. The National Center for Supercomputing Applications at the University of Illinois (Urbana–Champaign) won the award, which was shared by developers at Livermore, Sandia, and Los Alamos national laboratories.

A Livermore technology licensee, Cepheid, also won an R&D 100 Award for GeneXpert, a fully automated gene analysis system.

Fred Milanovich and Cynthia Nitta were awarded the 2002 Edward Teller Fellowships by the director. Milanovich was cited Innovative detection capabilities. Nitta was recognized for her technical and programmatic contributions to the weapons program.

Chemist Leonard Gray received the 2002 Glenn T. Seaborg Actinide Separation Medal from the Advisory Board of Actinides Separation Conference to honor Gray's "outstanding accomplishment and meritorious achievement in actinide separations science."

Charles Carrigan, named a Fulbright Distinguished Scholar, was invited to perform research and teach for a year at Cambridge University's Department of Earth Sciences and St. Edmund's College.

Seven Livermore physicists were named fellows of the American Physical Society (APS):

• Tomás Díaz de la Rubia was elected for his contributions to multiscale modeling of materials and seminal research on defect processes in solids under irradiation or high-strain-rate conditions.

• Yu-Jiuan Chen was selected for her work in revolutionizing the achievable beam quality of linear induction accelerators and advancing the state of the art of flash x-ray technology.

• Forrest Rogers was nominated for his work in plasma physics, including the development and application of the ACTEX equation of state and OPAL code opacity models.

• Barbara Lasinski was cited for code development and application to the understanding of the physics of targets for high-power laser experiments.

• Otto "Nino" Landen was named for his work in picosecond laser–plasma interactions, advanced diagnostics, x-ray-driven inertial confinement fusion implosions, and time-dependent hohlraum symmetry control.

• Andrew McMahan was elected for his work in completing effective Hamiltonian parameters for copper oxides and phase transitions of materials under high pressure and the subsequent solution of the associated models.

• Donald Prosnitz was cited for his pioneering work in free-electron lasers, accomplishments in fundamental physics research, and contributions to society through research supporting national security and law-enforcement technologies.

Claire Max, founding director of Livermore's Institute of Geophysics and Planetary Physics, was named a fellow of the American Academy of Arts and Sciences. Edward Teller is the only other academy member from the Laboratory.

Two physicists nominated by the Laboratory, Mark Hermann (at Livermore) and Paul Ricker (at the University of Chicago), were among 60 winners of the Presidential Early Career Award for Scientists and Engineers, the nation's highest honor for professionals at the outset of their research careers.

Willy Moss was elected fellow of the Acoustical Society of America. He was honored for contributions to numerical modeling and single-bubble sonoluminescence.

Eight Weapons Recognition of Excellence Awards were presented by NNSA to 88 Laboratory employees. Of the eight awards, two individuals were honored: Randall L. Simpson, for leadership of high explosives development and analysis activities, and retiree William F. Scanlin, Jr., for contributions to advancing weapon primary design and archival work. Awards were also presented to the Burn Code Project Team, the W80 Baselining Study Team, the ASCI White Integration Team, the W62 Pit Surveillance Team, and Livermore employees who were part of the trilaboratory Capability Computing Services Support Team and the Isentropic Compression Experiments Team.

Craig F. Smith was elected fellow of the American Association for the Advancement of Science, for distinguished contributions to the advancement of nuclear science and technology.

Laboratory physicist Kennedy Reed was named the 2003 recipient of the American Physical Society's John Wheatley Award. Kennedy's award was given for multifaceted contributions to the promotion of physics research and education in Africa.

The Council of Energy Resource Tribes (CERT) presented the 2002 American Indian Spirit Award to Laboratory Executive Officer Ron Cochran and the Laboratory for "continued dedication and commitment to Native American education and leadership."

Mimi Alford received the Aegis Award for producing "A Journey Through Time. . . The History of Engineering at LLNL." The Aegis is a national award that recognizes excellence in video and film production among nonbroadcast organizations, such as corporations, government, and universities.

Abbie Warrick received an International SEMATECH Corporate Excellence Award. The award recognizes exceptional performance, achievement, and innovation in contributing to the semiconductor industry.

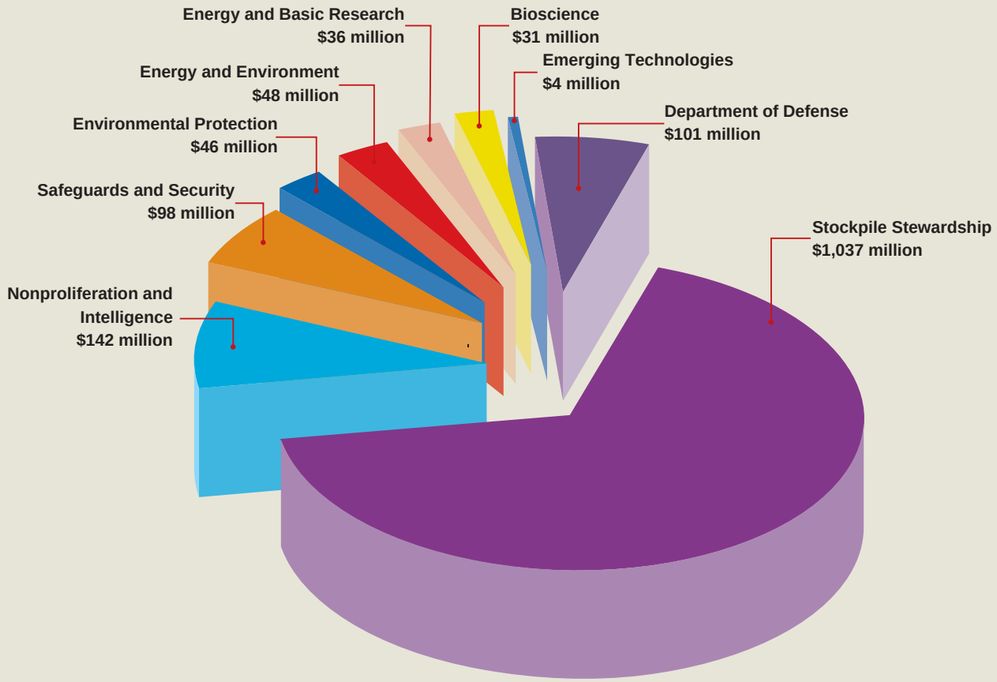
Valerie Roberts, area integration manager of infrastructure for the National Ignition Facility, was named Outstanding Woman in Construction, an award cosponsored by Arizona State University and the Greater Phoenix Chapter of the National Association of Women in Construction.

Laboratory Budget

Most of Livermore's $1.54-billion budget for FY 2002 was designated for research and development activities in program areas supporting the Department of Energy's missions.

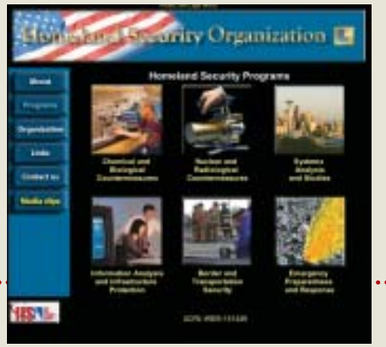
As a national security laboratory, Livermore is part of DOE's National Nuclear Security Administration (NNSA). The Laboratory's funding largely comes from the NNSA Office of Defense Programs for stockpile stewardship activities. Support for national security work also comes from the NNSA Office of Defense Nuclear Nonproliferation, various Department of Defense sponsors, and other federal agencies. Support from the Department of Homeland Security begins in 2003 with the transfer of program elements previously funded by DOE/NNSA to the new department.

As a multiprogram laboratory, Livermore's special capabilities are applied to meet important national needs. Activities include work for other DOE programs, principally Environmental Management and the Offices of Science, Civilian Radioactive Waste Management, Nuclear Energy, and Security and Emergency Operations. Non-DOE sponsors include federal agencies (such as the National Aeronautics and Space Administration, Nuclear Regulatory Commission, National Institutes of Health, and Environmental Protection Agency), State of California agencies, and industry.



Find Out More about Us

Visit the Laboratory's frequently updated Website at http://www.llnl.gov/ to learn more about our many scientific and technical programs. Discover the many opportunities for employment, academic research, and industrial partnerships. Read about our accomplishments each month in Science & Technology Review on the Web or in print.



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